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USSR Report

ENERGY

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FUELS

UKRAINE MINERAL RESOURCE PROSPECTS

Kiev RADYANS'KA UKRAYINA in Ukrainian 11 Mar 82 p 2

[Article by P. Shpak, UkSSR minister of geology: "Quest of Geologists"]

[Text] In the 11th Five-Year Plan this republic's geologists are to conduct prospecting and exploration for minerals, with the task of finding reserves at a significantly more rapid rate than that at which minerals are mined. This difficult task can be accomplished only on the basis of maximally reliable scientific forecasts, improving methods of mineral prospecting. This is why we so highly prize ties with science, constantly seeking to diversify and strengthen them.

Of course we rely first and foremost on our own scientific manpower -- the staffs of branch institutes. We have two of them. Working in close cooperation with the production subdivisions of this branch, both institutes have investigated and solved a number of important scientific problems which are of great practical significance.

The Ukrainian Scientific Research Institute for Geological Prospecting, for example, made an evaluation of this republic's gas and oil prospects. Geologists are actively investigating the oil and gas prospects of deep sedimentary formations. For these investigations a team of experts from scientific and production organizations was awarded a Ukrainian SSR State Prize.

The research conducted by this institute includes development of drilling mud formulations which make it possible to increase drilling rate and to improve the drilling process.

The workforce of another scientific establishment of this branch -- the Institute of Mineral Resources -- has important achievements to its credit in determination of the areas of prospecting for solid minerals. In particular, institute scientists developed an advanced beneficiation process for a type of ore which is new to this republic -- apatite-bearing carbonatites. Their work fostered the discovery of a number of deposits and achievement of the scheduled growth in reserves of iron, manganese and titanium ores. The institute has prepared forecasting maps on the principal coal seams of the southwestern part of the Donbass, and engineering studies have been conducted

which indicate the possibility of establishing in the Ukraine a domestic iron ore mineral raw materials base for blast-furnaceless steelmaking. Valuable criteria have been elaborated for searching for sulfur deposits, and a number of areas have been pinpointed which are promising for finding kaolin and graphite deposits....

I should like to stress the following, however. We would be unable to achieve substantial geological results if we were not provided with the results of basic and applied scientific research by scientists of the USSR and UkSSR academies of sciences. Our principal joint research project is study of the geologic structure of the major regions and determination of the patterns and mechanisms of distribution of deposits of the principal commercial minerals.

First of all we should mention the UkSSR Academy of Sciences Institute of Geological Sciences. We have long had ties with this scientific establishment. Its staff personnel, working in cooperation with geologists, have devised a new structural-geological model of the structure of the Dnieper-Donets graben, as well as stratigraphic diagrams of sedimentary complexes, which constitutes a basis for geologic mapping and prospecting for mineral deposits. Important research has been done on the ground water balance, and optimal utilization conditions for artesian basins have been specified. A research plan for the current five-year plan has been drawn up jointly with the institute. It specifies combined study of petroleum, gas, coal, and fuel shale geology on the territory of this republic.

The scientists at the UkSSR Academy of Sciences Institute of Geochemistry and Physics of Minerals have also done a great deal for geologists. They are studying the geologic structure of individual areas of the Ukraine, particularly metallogeny of the ore bodies of the Ukrainian shield. The institute, jointly with production organizations of this branch, has accomplished efficient development of rapid photometric surveys for finding fluorspar and rare metals.

Research conducted by the UkSSR Academy of Sciences Institute of Geophysics is of both theoretical and practical significance. It is devoted to the combined study, by geophysical methods, of the deep structure of the Earth's crust and upper mantle. This is a reliable foundation for predicting the discovery of many types of useful minerals.

Considerable attention in the research conducted by scientific establishments is also devoted to further provision of sophisticated equipment to geological prospecting personnel. Scientists at the Institute of Electric Welding imeni Ye. O. Paton, for example, have developed modern techniques for welding casing pipe. Adoption of this method of casing wellbores has simplified well construction and reduced the time required to ready wells for testing. In addition, every year approximately 300 tons of pipe and 500 tons of cement can be saved. Research conducted by scientists at the UkSSR Academy of Sciences Institute of Superhard Materials and branch experts on the further improvement of hardrock cutting tools, based on the "Slavutych" alloy, has made it possible to speed the drilling of deep wells, reducing expenditures on tripping in and tripping out operations, and reducing the per-meter drilling cost by 30 rubles.

We could continue the list of scientific establishments with which our branch maintains business contacts. Such contacts help us more clearly see the prospects of exploration and prospecting activities and help us improve the efficiency of geological exploration work. This is attested by the following facts. Exploitation of just two natural gas and titanium deposits in the Ukraine will generate almost enough revenue in order fully to recoup the costs of prospecting and exploration for all types of mineral raw materials in this republic during the entire five-year plan. As regards oil and gas, there is probably no other type of raw material the extraction of which is so profitable. Commercial exploitation of iron ore deposits in Kremenchugskiy Rayon which have been discovered in the last decade will generate for the national economy income totaling several tens of billions of rubles. During prospecting for and surveying of these ore bodies, considerable study was made of the distribution of mineral deposits and on improving mineral prospecting methods.

One could cite dozens of such examples. This is why 16 million rubles are allocated for our ministry on scientific research activities aimed at securing the requirements of geological exploration activities in the current five-year plan. These funds will be spent primarily on discovering new mineral deposits.

We must state that with each passing year geological prospecting will be conducted at increasingly greater depths, especially in such developed regions as the Ukraine. Therefore the success of each such prospecting operation will depend to an increasingly greater degree on scientific forecasts prepared by scientists. Thanks to the joint efforts of the workforces of ministries and scientific workers of geology-specialization institutes, reserves of the Ukraine's traditional minerals discovered by geologists are in large measure satisfying the requirements of the principal branches and sectors of the economy. And with an increase in the energy requirements of industrial processes, we anticipate a further increase in the production of fuel and energy raw materials and discovery of new reserves. This means responsible tasks assigned to our ministry, which cannot be accomplished without the aid of science.

Unfortunately this republic's scientific and technical potential for solving such problems is not being fully utilized at the present time. Because of not entirely precise planning of scientific research activities, an insufficiently comprehensive character of research, and in a number of instances due to poor coordination between research activities and practical tasks, some forecasts do not prove out. This is particularly characteristic of oil and gas exploration at great depths and prospecting for mercury, nonferrous and rare metals deposits.

Today we expect of the people at the UkSSR Academy of Sciences Institute of Geological Sciences, Institute of Geology and Geochemistry of Fossil Fuels, as well as other scientific establishments further deepening of investigation of the patterns and mechanisms of distribution of useful minerals, more precise forecasting and better geological appraisal of areas and deposits, development and improvement of methods of seismic prospecting, construction of mathematical models of optimization of placement of exploration wells on oil and gas area structures and pools.

We are expecting the UkSSR Academy of Sciences Institute of Geophysics to expand research on improving methods of studying complex structures for oil and gas to depths of 6-7 kilometers, as well as prospecting for ore bodies on the Ukrainian shield and its flanks.

One of our important joint tasks is the search for and adding to reserves of high-grade coal not only in old, developed areas but also in the Western and Northern Donbass and in the L'vov-Volyn' basin. The large-scale water engineering and land reclamation projects will require deeper scientific substantiation. Past underestimation of the effect of such projects on the environment is already leading in certain instances to flooding of land, towns, and villages, and to increased frequency of mudslides.

There is one other problem in the solving of which we will be counting on the energetic support of "heavy science": we want to achieve further increase in drilling rates and to improve the efficiency of geological activities. We are expecting from the institute of the UkSSR Academy of Sciences new designs of automated systems for controlling the parameters of drilling wells by turbine and rotary methods down to depths of 8000 meters, the development of equipment to automate tripping in and tripping out operations, the development of new components for drilling muds, designs and equipping arrangements for special hardrock drilling tools. Incorporation of these and a great many other research results will enable geologists to improve the efficiency of geological prospecting and drilling activities. And this is demanded of them by the times and our practical management activities.

Working shoulder to shoulder, in close productive cooperation, mineral prospectors and scientists must do everything to ensure building in the 11th Five-Year Plan a strong foundation for practical implementation of tasks pertaining to further strengthening the raw materials base of the mining branches of industry, as specified by the decisions of the 26th CPSU Congress.

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CSO: 1811/21

FUELS

ORENBURGGAZPROM ANNOUNCES SOCIALIST COMMITMENTS

Moscow PRAVDA in Russian, 4 Jul 82, p 1

[Article: "Responding to Concern: Socialist Commitments of the Collective of the Order of Lenin All-Union Industrial Association 'Orenburggazprom' for 1982"]

[Text] By implementing the historical decisions of the 26th CPSU Congress regarding accelerated development of the gas industry, the collective of the Order of Lenin All-Union Production Association "Orenburggazprom" is successfully fulfilling the planned assignments and socialist commitments of the second year of the 11th Five-Year Plan. In 5 months, they have extracted above the plan over 600 million m³ of natural gas, produced 2,000 T of sulfur, obtained R 12 million of profit, and overfulfilled the assignment for labor productivity.

The decisions of the May (1982) plenum of the CPSU Central Committee and the report of the general secretary of the CPSU Central Committee Comrade L. I. Brezhnev "On the USSR Food Program for the Period up to 1990 and Measures for its Realization" have been adopted in the labor collectives of the association with enormous inspiration and unanimous approval.

In response to the concern of the party and government for improved welfare of the Soviet people, striving to make a specific contribution to the implementation of the food program, the association collective has been included in the national competition for achievement of the planned frontiers and has adopted enhanced socialist commitments for 1982.

For purposes of more complete satisfaction of the needs of the agricultural-industrial complex for fuel and raw material above the previously adopted commitments, the collective has decided to extract 300 million m³ of natural gas, 10,000 T of gas condensate and to generate for the production of mineral fertilizers 3,000 T of sulfur. They have decided to build ahead of schedule 32 km of gas pipelines, outlets to the rural populated areas. In the kolhozes and so. hoes under the patronage of the oblast construction is underway of 38 two-apartment houses, help is being given to grow vegetables, to prepare and to send 500 combines for harvesting.

They will successively improve the volumes and efficiency of producing products in auxiliary rural farms, obtain 13.7 kg of meat and 9.3 kg of greenhouse

vegetables for each worker of the association. They will create a reliable basis for further development of animal husbandry, and this year increase the head of cattle 1.4-fold.

The workers, engineering-technical workers and employees of the association have assured the Leninist Communist Party Central Committee, and Comrade L. I. Brezhnev personally that they will apply all their efforts, knowledge and experience to implementing the decisions of the May (1982) CPSU Central Committee Plenum and have called upon the collectives of the enterprises and organizations of the gas industry to unfold even more widely socialist competition for successful realization of the food program, and this year already to achieve a significant increase in food resources.

9035

CSO: 1822/222

FUELS

CONSTRUCTION PROBLEMS ARISE AT GAS COMPRESSOR STATION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Jun 82, p 2

[Article by G. Zazvonov: "Compressor by Mail"]

[Text] It would seem that it is a simple matter to build a gas compressor station. Not somewhere in a taiga thicket or tundra, but in a well developed industrial zone. The task in itself is important and honorable: for this object is a necessary link in the gas transport system from Urengoy to the European sector of the country. This is what the leaders of Glavlipetskstroy thought in the beginning of the year, starting construction of the station near the city of Yelets with their partner-subcontractors. Then they also defined the time for the end of all operations: June of this year. The schedule was compressed but real.

The participants of the construction understandably hoped for efficient help of the clients and designers. But in vain. Now the situation at the start-up object is extremely difficult. The trust "Lipetskstroy" has prepared the foundations for the equipment for a long time. Now the mechanics-installers of the trust "Metallurgprokatmontazh" have only selectively installed individual assemblies of the compressor operation. Why? The management of the enterprise under construction of the line administration for main gas pipelines of the Ministry of the Gas Industry (headed by K. Bortsov) does not provide the construction site with complete equipment. Of the 286 units, only 150 have been sent to the site. There are 415 units of slide valves, valves, spigots and other fittings missing. It is impossible to assemble the compressor station without them. All of this should have been received and unloaded at the small station Pazhen' not far from the construction site by the representatives of the customer. However they are not here and the brigade of installers has been forced to do it.

There are large claims by the mechanics-installers against the general designer, the All-Union Scientific Research and Planning Institute "Transgaz" of the Ministry of the Gas Industry (chief engineer N. Shuran). The fact is that equipment has begun to arrive at the construction site that does not appear in the plan. It is understandable that the substitutions have been sanctioned by the customer. But it is not easy for the installers. In order to install a unit that has not been designated in the plan, they have to have the permission of the institute. A unique postal bridge has been formed between Kiev where

the institute is located, and Lipetsk where the installation administration is located. Weeks pass before a positive response is obtained. Would it not be easier for the leaders of the project to come to Yelets and rapidly solve the urgent tasks?

The interruptions multiply and multiply. The orders for fabrication of pipe assemblies have been placed on the industrial base of the trust "Metallurgprokatmontazh." The country's first mechanized production line for their production is operating there. But the misfortune is that it is not yet possible to use it: the Glavlipetskstroy of the USSR Ministry of Heavy Machine Construction (head L. Vasil'yev) is supplying pipes without certificates of technical test.

We will say directly that this is an extremely lax approach to this matter.

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CSO: 1822/222

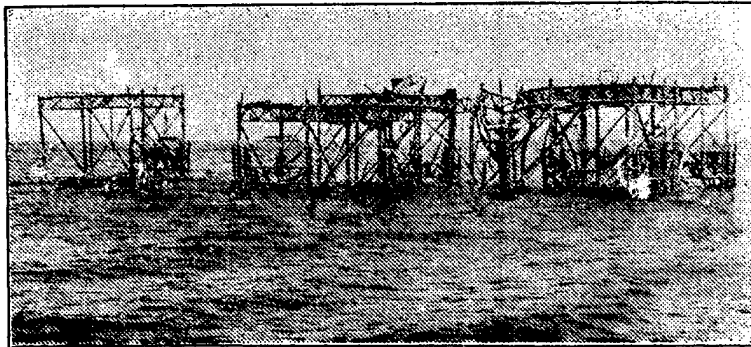
FUELS

OFFSHORE DRILLING PLATFORMS ABANDONED

Moscow TRUD in Russian, 17 Jun 82 p 2

[Article: "Iron Islands"]

[Text] These empty iron islands have not been marked on geographic maps, but there are many of them in the Caspian Sea. In the region of the Cheleken Peninsula alone, according to information of the Turkmen "Vtorchermet," there are 17 platforms for drilling and extracting oil which have been abandoned by the all-union production association "Kaspmorneftegazprom" to the mercy of fate. They are being destroyed, they are contaminating the water area of the sea, and making the regions dangerous for shipping. Moreover, the iron islands represent thousands of tons of metal scrap. Back in 1979, the representatives of the all-union production association "Kaspmorneftegaz" confirmed in an official letter that the platforms have been written off, were not needed by anyone and should be sent for metal scrap. But until now the association has not sent to "Vtorchermet" a single gram of metal.



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CSO: 1822/222

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FINLAND BUILDS NEW SHIPS FOR SOVIET UNION

Moscow MORSKOY FLOT in Russian, No 6, 82 p 47

[Article: "Cable Ship and Catamarans"]

[Text] At the end of 1981, the cable ship "Nepryadva" was built at the ship wharf of the administration department "Vyartsil'" (Finland). It is designed for laying cables in coastal regions of the Baltic, Black, Azov and Caspian Seas. The dimensions of the ship took into consideration the conditions of the internal waterways of the Soviet Union.

The power unit of the ship is diesel-electric. The main generators guarantee power for both the propelling electric engines and other current consumers.

The primary power is generated by two diesels of the firm "Vyartsilya-Vaasa" 6R22.

Cables are laid with the help of two electric hydraulic winches. The ship can take about 300 T of cable on the route.

The inner rooms are designed for a crew of 38.

The greatest length of the ship is 75.9 m, width 12.6, draft 3 m. The power of the energy unit is 1 MW (1360 h.p.) and permits the ship to reach a velocity of 11 knots.

In 1983-1985, two crane ships with lifting capacity of 600 T each will be built at the ship wharf of the administration department "Vyartsilya" (Finland) for the Soviet Union. These are crane ships with lifting capacity of 600 T each. These two-frame vessels (catamarans) are designed for shipping and installation operations during the operation of oil and gas deposits on the continental shelf.

The greatest length of this ship is 141.4 m, width 54.5, draft 4.0 m, lifting capacity of the crane 600 T. There are three diesel generators of the firm "Vyartsilya-Vaasa" in 6 P32 installed on the catamaran with total power 5.5 MW.

In their characteristics these catamarans significantly differ from all ships of this type. The starting point during designing was the fact that the ships could operate both in cold (up to -30°C) and in warm (up to $+45^{\circ}\text{C}$) climate conditions.

FUELS

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GAS SUPPLY SYSTEM COMPUTERIZED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 pp 6, 10

[Article by V. I. Khalatin, M. M. Mayorov, Central Dispatcher Administration of the Unified Energy System of Socialist Countries of the Unified System of Gas Supply of the USSR, All-Union Scientific Production Association "Soyuzgazavtomatika": "Improvement in Control of the Unified System of Gas Supply of the USSR Based on the Introduction of Computers"]

[Text] The creation of a unified automated system for controlling the unified system of gas supply in the USSR based on an information-computer system of high output will improve the reliability of gas supply to the national economy.

The active Unified System of Gas Supply (USG) of the USSR is the largest energy complex which is linked by unity of the technological regime and does not have analogs in world practice. Even now it encompasses practically the entire territory of the country, supplying gas to the most important industrial regions, cities and settlements. The multiple-ring gas transport liquid of USG has a total length of about 130,000 km with a large number of compressor stations.

The further development of the USG, as well as increase in the percentage of gas in supplying energy to the country's national economy require an improvement in the efficiency and reliability of its operation, considerable improvement in the rapid-dispatcher control.

The main task of rapid control of the USG is to distribute the gas resources with guaranteed coverage of the gas consumption peaks and regard for the external ties with other subsystems of the fuel and energy complex.

In order to solve this task it is necessary to guarantee rapid control of gas streams in the system using intersystem connectors, as well as controlling the technological regimes of transporting gas on specific trunklines and distributor gas pipelines. In this case it is necessary to take into consideration the forecasts of gas consumption, unity of the hydraulic regime of the gas supply system, close interregional ties, and time lag of the technological processes in the system.

Rapid control of the gas streams is viewed as a solution to the task of maintaining a balance between the extracted gas, gas taken from the underground gas

reservoirs and gas supply to the consumers. In extreme situations, under conditions of a temporary imbalance in extraction and demand for gas, this task is solved by using gas reserves accumulated in pipelines, underground reservoirs, or through reserve fuel by the consumers. In each specific situation, in selecting the controlling actions it is necessary to start from the common interests of functioning of the country's fuel and energy complex.

Rapid dispatcher control of the operation of main and distribution gas pipelines must guarantee optimizing of the technological regimes of gas transporting according to the appropriate technical and economic criteria. Because of the considerable increase in the length of the main trunkline and main gas pipelines, the most important of these criteria is minimizing outlays of energy for transporting gas to the consumption regions.

The definitive place of the USG in the fuel and energy complex places rigid restrictions on the time for making decisions in rapid control of gas supply, especially in extreme situations. For rapid correct decisions, the dispatcher services must be supplied with timely, objective, and reliable information regarding the occurrence of the technological regimes, and secondly, have fast-response equipment to model and analyze them.

In order to solve these tasks it is necessary to organize a highly effective automated system for controlling the Unified System of Gas Supply of the country based on the broad introduction of modern methods, as well as automatic equipment and computer equipment at all levels of control.

Control of the Unified System of Gas Supply in the country is currently done using a set of automated control systems at different levels. At the level of the Central Dispatcher Administration of the Unified Energy System of Socialist Countries (TsDU) of the USG, an automated system of dispatcher control of the USG is functioning (ASDU USG). At the main gas fields and main gas pipelines which determine the operating regime of the USG, there is an ASUTP [automated system for controlling the technological process] for extraction and transporting of gas.

The ASDU USG guarantees 24-hour collection of data regarding the actual operating regimes of the USSR USG with illustration of the results on displays of the dispatchers, calculation of the optimal technological regimes of the main interregional gas transport systems, processing of information for gas and condensate extraction, injection and removal of gas from the underground reservoirs, export and import of gas, and gas supply to the consumers. The main tasks of this control system are to predict the operating conditions of the USG, generate the optimal balanced load dispatcher graphs and their realization.

The technical base for the ASDU USG is the information-computer system consisting of a mini computer and universal computers which control the information points, regional and production information-computer center (ICC).

At large fields of the country, Urengoy, Medvezh'ye, Orenburg, Shatlyk and others, an ASUTP for gas extraction is functioning. It consists of a system for controlling the working of the field and preparation of gas for further transport.

The ASUTP for working the field based on machine processing of results from hydrodynamic well studies, interpretation of geological bed and well parameters, predicting the change in bed pressure and advance of bed waters with different recovery of gas guarantee the most complete use of gas reserves by increasing the current and final gas output, efficient use of bed energy, and prolonging the period of anhydrous and compressor-free operation of the wells.

The ASUTP of gas preparation solves the task of monitoring and controlling the regimes of gas and condensate preparation, planning of the operating regimes of the field, correlating the plans of possible gas extraction and its supply to the gas supply system.

The technical base for the ASUTP of gas extraction is the controlling computers and equipment of comprehensive automation, including systems of remote control, centralized monitoring and control and equipment of local automation.

The ASUTP of gas transport which is operating in the associations "Tyumentransgaz," "Gor'kiytransgaz," "Ukhtatransgaz," "Sredaztransgaz," "Saratovtransgaz," "Mostransgaz," as well as the gas pipeline "Soyuz" and other facilities guarantees control of the sections in the gas pipeline system which encompass 10-15 compressor stations. Their function includes monitoring the actual regimes, optimization calculations of the technological regimes, realization of the assigned loading dispatcher graphs in boundaries of the association and command of the upper level of control.

The technical base for functioning of the ASUTP of gas transport is the controlling computer which is connected by equipment of remote control with automated equipment of compressor stations. It fulfills automatic collection and processing of data, their illustration and printing at the demand of the dispatcher personnel, as well as calculation of technological regimes.

Technological processes at compressor stations are automated. The systems of unit automation implement start-up, stopping and protection of the gas pumping units and regulate their operating regime. The systems of centralized monitoring and control collect information, guarantee systematic monitoring of the operation of compressor station equipment and output of information to the remote control system for transmission to the computer center of the association. The systems of remote control also guarantee collection of data from the sections of gas pipelines adjoining the compressor station. The broad introduction of these systems will make it possible to reduce to the maximum the operating personnel.

The main direction for further development of automated control of the USG follows from the main task of functioning of the gas supply system, extraction, transporting and distribution of the quantity of gas allocated for the assigned period of time between the consumers with the minimum costs.

The basic cost developed during:
shortages of gas supplies to the consumers that do not have the possibility of switching to reserve fuel;
transition to reserve fuel of the buffer consumers;
transporting and storage of gas.

One of the main tasks of the automated control system of the USG is to minimize these costs.

When extreme situations develop which are generated by external or internal causes, the automated control system of the USG must guarantee timely realization of the controlling actions which make it possible to preserve gas reserves in the system on a level that is no lower than the minimum permissible according to conditions of gas supply to the consumers.

The technological processes in the USG occur in time under the influence of external factors and as a result of internal dynamic phenomena of the system. In order to describe the behavior of the system under such conditions, several temporal sections are isolated: long-term, average-term and short-term.

In the long-term section, the USG automated control system must guarantee distribution of gas among the consumers for a year, calculation of the necessary gas streams and establishment of the sequence for introducing facilities (loopings, compressor stations) to guarantee the planned gas streams.

The basic task of the control system in the average-term section (10 days, month) is to control the gas reserves in the USG. In this case there must be guaranteed balancing of the graphs of gas supply to the consumers, collection of gas from the fields with regard for throughput of the gas transport systems, collection (injection) into the underground gas reservoir and schedules for limiting the buffer consumers.

The automated control system in the short-term section (1-2 days) must compensate for deviations from the schedules defined in solving the task of control in the average-term section.

Control in the short-term section must be implemented practically on the scale of real time and directly affect the operation of the compressor stations, regime of recovery (injection) of gas from the underground gas reservoir with changes if necessary in schedules of gas supply to the buffer consumers.

The fulfillment of these global tasks is possible with functional unification of the automated control system of varying level into a unified hierarchical complex of the USG automated control system based on the sector computer network with intermachine exchange of information and distributed automated data bank. In this case the functions of the upper levels are to work out a strategy of control, the lower to form details of the strategic solutions with determination of the methods for technological realization of the control commands. The task of the IVK under these conditions is maximum automation of the computer, analytical and information functions to assist the dispatcher who is making the final decisions.

Selection of unitized variables for modeling each level of control must be based on separation of the functions according to levels of control with regard for the varying degree of detail, and namely:

ASDU of the USG--formation of streams and determination of economical regimes (including pressures at narrow points) based on an enlarged calculation plan and unitized characteristics;

ASDU of the regional subsystem--formation of streams in limits of the region and selection of economical regimes based on a detailed plan;

ASUTP of the production association and system of controlling technological objects--realization of the control command, optimization of regimes, control of equipment based on the use of detailed technological plans, compensation for daily nonuniformity of gas consumption, identification of technological characteristics of equipment.

Thus, the development of an automated control system of the USG requires unification of computer resources of the active and created ICC into a sector computer network which is organized on the basis of linked processors, conjugated with universal computers of the ICC of industrial, production associations, as well as the Ministry of the Gas Industry Main Computer Center and guaranteeing exchange of information between computers of the ICC.

The sector computer network will also include mini computers of the ASUTP for extraction and transporting of gas, conjugated with technological facilities and equipment by communications channels through microprocessor devices arranged on compressor stations of gas pipelines and units of gas preparation at the fields.

The sector computer network will make it possible to realize the distributed automated data bank on principles of an integrated system of collection and processing of information with its one-time start-up and multiple use at all levels of control by automatic retranslation after enlargement and averaging of the indicators. In this case, the dispatcher personnel of all levels will be given the opportunity of requesting data about the technological regimes at any point of the USG at the present moment in time, and under extreme situations, the response time will not exceed several minutes.

The creation of an automated system for controlling the USG based on a distributed information-computer system of high output will make it possible to solve the task of rapid control of the USG in all time segments in normal and extreme situations, will guarantee control of the USG according to criteria of optimization, and will significantly improve the reliability of gas supply to the national economy.

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CSO: 1822/240

FUELS

FLUOROPLASTIC FILTERS DEVELOPED FOR GAS PURIFICATION

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 p 11

[Article by V. I. Pakki, Ukrainian Scientific Research Institute of Gas: "Apparatus with Fluoroplastic Filter-Packets"]

[Text] With a rise in the volume of gas extraction, the requirements for the quality of field preparation of gas in the technological plans, and improved efficiency of the separation equipment are constantly increased.

The Ukrainian Scientific Research Institute of Gas has developed and introduced separators with fluoroplastic filter-packets for gas purification of the first degree of separation in series manufacture blocks GB-23, at the second stage of separation, in series manufacture blocks GB-18, and filters for purifying fuel gas at the compressor stations (CC).

Ukrainian Scientific Research Institute of Gas has mastered series manufacture of fluoroplastic filter elements of the type FEP-152 x 205.20. They are designed for use in filters for fine oil purification FZhP-80 and for reconstructing separation equipment.

The fluoroplastic filter elements in their technical characteristics are better than the ceramic, metal-ceramic and fiberglass. They are reliable in aggressive media. This is a decisive factor for their use for example, for separation elements at the Orenburg field whose gas contains hydrogen sulfide.

Depending on the purpose, fluoroplastic filter elements of different diameters can be fabricated, from 46 to 152 mm, and varying fineness of purification, from 5 to 20 μm .

As a result of industrial tests of apparatus with fluoroplastic filters under different field conditions, at different temperatures and specific content of liquid and mechanical admixtures, it was established that they guarantee complete trapping of the bed mineralized water, complete trapping of mechanical admixtures (from 5 μm and higher). The efficiency of condensate trapping is 99 percent.

The conducted set of studies of fluoroplastic filter elements under different conditions makes it possible to recommend them for use during extraction, preparation and transporting of natural gas.

In extracting natural gas based on fluoroplastic filter elements, face filters can be developed for preventing removal of sand from the wells. Equipping the control and observation wells with these filters will make it possible to reliably monitor the working of the field.

Taking into consideration that fluoroplastic filter elements are biologically neutral, they can be used as face filters in water wells.

The use of fluoroplastic filter elements in preparing gas at the unit for comprehensive gas preparation will make it possible to significantly improve the operating life of the field equipment in the first stage of separation, prevent contamination with mechanical admixtures of the hydrate-formation inhibitors, for example diethylene glycol. It is also no longer necessary to have ion filters to desalinate the DEG. Operating efficiency of the heat-exchange equipment is improved.

At the second stage of separation, fluoroplastic filter packets in apparatus designed by the Ukrainian Scientific Research Institute of Gas guarantee effective trapping of the hydrocarbon condensate, practically complete trapping of aqueous solutions of DEG, calcium chloride and other inhibitors. In addition, productivity of the separation equipment increases 2-5-fold.

The use of fluoroplastic filters of the CC of main gas pipelines guaranteed reliable operation of the gas preparation equipment in the compressor stations. In particular, when filters are installed for purifying fuel gas of mechanical admixtures and condensate, there is an increase in the operating time of the gas preparation equipment turbine blades, and reliable operation of the entire CC improves.

The Ukrainian Scientific Research Institute of Gas has conducted studies and given the departmental commission a filter-separator for purification of fuel gas at the compressor station Dar'yalyk. At the compressor station Khiva, studies have been conducted for purification of an individual fuel gas of a gas preparation unit of different types. According to preliminary estimates, the filter with fluoroplastic filter elements guarantees the most effective gas purification.

Good results have also been obtained using fluoroplastic filters in dust-traps for purification of transported gas.

The compressor station Khiva has redesigned the separator D_u -1600 mm and fiber-glass filter packets have been replaced with fluoroplastic. Studies have indicated that the latter can be recommended for broad introduction at compressor stations.

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FUELS

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GAS GUSHER FLAME EXTINGUISHING TECHNIQUE RECOMMENDED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 pp 12-13

[Article by P. V. Kutsyn, A. P. Semenov, I. M. Abduragimov, G. N. Babiyev, Ye. M. Gerasimov, Ministry of the Gas Industry, AUCCTU, Orenburggazprom, Volga-Ural Scientific Research and Planning Institute of Gas: "Instantaneous Elimination of a Burning Gas Gusher"]

[Text] The developed units for extinguishing a gas flame during a fire at a gas or a gas-oil gusher make it possible to eliminate the fire in 1-2 s remotely, from a distance of 5-10 m.

An important condition for drilling and operating wells is to guarantee fire safety, not to permit the development of gas manifestations and open gas gushers. However, these phenomena for a number of reasons still occur in practice.

There are different types of known gushers. Their classification is governed by the composition of the gushing fluid, output, nature of the formed gusher jet, condition of the well and surface equipment. In many cases, ignition of the gas gusher occurs.

Traditional technology for eliminating a burning gas gusher is stipulated for the majority of cases of its extinguishing. This is a dangerous and complicated operation. There have been cases where it lasted several months.

Consequently, an important task is to conduct comprehensive studies in order to develop means of reducing the time spent on eliminating a gas gusher, and to improve the safety of the workers.

Experimental-industrial studies were conducted on a test site simulating a burning gas gusher with different outputs up to 10 million m³/day (the set task has previously been resolved with output of 3million m³/day)

Characteristics of the flame	Output of gas, million m ³ /day				
	1.87	2.82	4.74	6.54	8.59
Height, m	20.5	24.7	27	45.5	48
Area, m ²	70	103	135	303	400

The artificial well is supplied with gas on a loop 324 mm in diameter from the Orenburg-Ufa gas pipeline. The height of the well head connection above the earth is 1800 mm, the outer and inner diameters are 245 and 221 mm respectively. The material of the connections is steel D. At the site of emergence of the gas, a junction is welded from 325 to 245 mm, made of steel 20. The upper part of the junction has an inner threading under the casing 245 mm in diameter. The gas output pipe is covered with waterproofing. The welded seams are checked by noncontact radiometric methods. The gas outlet was pressurized to 9 MPa. The working pressure in the main gas pipeline is 4.5 MPa. A slide valve with hydraulic control and measurement assembly for calculating gas output are installed on the gas outlet. Water is supplied to the gas outlet on fire sleeves with the help of a fire pumping station from a ground reservoir with capacity of 650 m³ which has constant replenishment with technical water by a water line 1000 mm long. The distance from the reservoir to the well head is 220 m.

There is telephone communication at the test site. The fire fighting equipment is supplied with electricity from a mobile power plant.

The set of studies was done at the test site in November 1981.

The Administration of Accident Prevention, militarized units and protection of enterprises of the Ministry of the Gas Industry, all-union production association "Orenburggazprom," the Orenburg militarized unit for prevention of the outbreak and elimination of open gas and oil gushers, the highest engineering fire fighting school, the Volga-Ural Scientific Research and Planning Institute of Gas, and the All-Union Scientific Research Institute of Gas participated in the preparation, organization and conducting of comprehensive studies on the condition for eliminating a burning high output gusher.

The brightness temperature of the flame of the burning gas gusher was measured with outputs of 1.87, 2.82, 4.71, 6.54, 8.59 and 9.19 million m³/day with distance of 50 m from the well head using a visual brightness pyrometer "Promin'." The measurements indicated that the temperature of the combustion zone with the studied outputs is 1500-1280°C, zone of additional combustion 1465-1350°C. The flame temperature with outputs of 1.87 million m³ was 1430°C, with 2.82 million m³, 1430°C, with 4.7 million m³, 1450°C, with 6.54 million m³, 1350°C. The height and area of the flame defined by synchronous photography are presented in the table.

The air temperature in the zone of the flame tongue increased slowly and reached positive values with output of 4.71 million m³ at a distance of 3 m from the head. With output of 8.7 million m³/day, the maximum air temperature was +5°C (with temperature of the surrounding air -6°C).

Relative air humidity measured by aspiration psychrometer at different distances from the gusher head (from 100 to 3 m) fluctuated from 91 to 20 percent. Humidity diminished with a rise in the output and approach to the head. Wind velocity determined by the dish anemometer U5 at distances from 100 to 20 m from the head was from 1.3 to 12.5 m/s. Changes in wind velocity depending on the distance from the head of gas output were not observed.

Temperature of the soil surface was measured by rod-shaped mercury thermometer with scale from 0 to 500°C with scale division of 2° at distances from the head 1-40 m. The thermometer was installed in a wooden plank so that during the measurements one could load the thermometer reservoir into the soil to a depth of 1-1.5 cm. With output of 6.6 million m³/day at distances from the head 1, 6, 10, 15, 20 and 30 m, the soil temperature was 116, 184, 140, 118, 112 and 8°C respectively. It should be noted that with all values of gusher output, the greatest values of the soil temperature were recorded at distance of 6 m from the well head. Distribution of soil temperature should be taken into consideration in selecting the equipment used to eliminate the gusher.

The degree of illumination created by the light of the gas gusher flame was measured at all studied gas outputs (from 1.3 to 8.6 million m³/day). The maximum horizontal degree of illumination in a radius of 20 m from the head was 25,000 lux. With output of 8.69 m³/day at a distance of 50 m from the head it was 5000 lux, and at a distance of 100 m, 4000 lux.

The intensity (surface density) of thermal fluxes at the studied outputs was measured at different distances: from 0 to 100 m from the gusher head. It significantly rose with an increase in output. The maximum intensity (28 kW/m²) was recorded with output of 8.59 million m³/day at a distance of 5 m from the head. Intensity of thermal fluxes at the marker 0-3 m from the head also rises with an increase in gusher output, but always by 20-25 percent lower than in the 5-10-meter zone from the head.

In the study it was established that with an increase in output, the level of gusher noise increased from 84 db with output of 1.3 million m³/day to 116 db with output of 8.59 million m³.

Testings also confirmed the suitability of the outfits developed by the All-Union Scientific Research Institute of Gas for the gusher workers to work on the well head at all studied gusher outputs.

With output of 9.6 million m³/day, a check was made of the applicability of the special unit for protection of people and equipment from surplus thermal fluxes by creating a water curtain on the burning gas gusher. Water was supplied to the unit at a pressure of 0.8 MPa with consumption of 80 l/s. Above the working zone, near the gusher head, a water curtain 2.5 m wide was created, with effective thickness of 1.5 m and maximum height of 15 m. Without the use of this curtain, the surface density of the thermal fluxes 10 m from the flame head with output of 9.6 million m³/day was 28 kW/m². The soil temperature reached 200°C, the brightness temperature of the flame in the center of the tongue was 1250°C. After creation of the curtain, the intensity of thermal fluxes and brightness temperature of the flame diminished and were 1.4-2 kW/m² and 1140°C respectively. This made it possible to work without protection of the hands and face. Thus, this method of protecting people and equipment can be recommended for broad application at real gushers.

In order to extinguish the tongue of the flame with a fire at a gas or gas-oil gusher, special units were developed which make it possible to extinguish the fire in 1-2 s remotely, from a distance of 5-10 m. Verification of the efficiency of these units was conducted with gas output of 9.6 million m³/day. In

order to extinguish a burning gas gusher, according to preliminary calculations, at a distance of 7 m from the well head at an angle of 70° to the horizon, a device was installed which makes it possible to supply extinguishing resources of the PSB-3 powder type to the flame tongue. After establishment of a stable gas consumption, the jet was ignited with an incendiary rocket. The height of the flame ejection from the well head reached 10 m, and the total height of the tongue was 75 m. Within 2 minutes of free burning after stabilization of all tongue parameters, the system of fire extinguishing was turned on. The extinguishing time was 2 s, and in this case a total of 150 kg of powder were consumed.

The findings make it possible to recommend a unit of this type for industrial use in extinguishing real burning gas gushers with output of 10 million m³/day and more.

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FUELS

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CEMA COUNTRIES COOPERATE IN GAS BURNER EQUIPMENT PRODUCTION

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 pp 14-15

[Article by N. A. Fedorov, all-union production association "Soyuzpromgas":
"Efficient Use of Natural Gas in the CEMA Member Countries: Problems are
Solved Together"]

[Text] Scientific-technical cooperation of the CEMA member countries for production of advanced gas-burner equipment is an important factor in the efficient and economical use of gas.

The percentage of natural gas in the structure of primary energy carriers of socialist countries which in 1980 reached 26 percent, continues to noticeably increase under the influence of its import from the Soviet Union.

The Council of Economic Mutual Assistance has prepared a long-term target program "Cooperation for Economical and Efficient Use of Fuel and Energy," whose fulfillment will promote the development of highly effective methods of using gas as a fuel and creating gas-using equipment in the People's Republic of Bulgaria, Hungarian People's Republic, the GDR, Polish People's Republic, USSR and CSSR. There are almost 40 organizations cooperating within the coordination center on this problem.

The program of scientific and technical cooperation of the CEMA member countries up to 1985 stipulates the development and introduction of a method and resources for effective use of gas in those sectors where its application is the most expedient.

Automated burner devices are being created for different thermal units, methods and means of optimizing thermal processes for gas combustion which meet the highest technological requirements for conservation of fuel and prevent pollution of the environment, technical solutions are being developed for the use of secondary energy resources and improving efficiency of industrial and communal-general gas-using equipment, reduction in specific consumption of fuel for the production of energy-intensive products.

The parties of the Hungarian People's Republic and the USSR have created a burner with a system of firing and control of the tongue for a rotating cement furnace.

The GDR and USSR are working on the production of high-speed burners with ceramic combustion chamber.

The Bulgarian and Soviet specialists are introducing combined furnace-burner devices for hot water heaters which make it possible to burn up to seven types of fuel. In 1981, the USSR with the participation of specialists from the cooperating countries held a seminar on methods of calculating and operating these devices.

One of the trends for improving the efficiency of gas use is the development in Poland and the Soviet Union of pulsation burners of the resonance type. When fuel is burned in a vibration regime, the processes of combustion and heat and mass exchange can be intensified to a considerable degree. However, vibration combustion is accompanied by an increased noise level, consequently the Bulgarian specialists developed dampers for different types of burners.

Developments for recovery of heat and use of secondary energy resources stipulate the creation of burners with built-in recuperator, furnaces with internal recuperation of heat, recuperators for industrial furnaces, thermal pumps, and units of steam-gas cycle.

The Institute for Research and Use of Fuel in Prague in 1981 started development according to the KOTs program, a type series of high-speed burners with output of 100-400 kW with built-in recuperator for annealing and heating furnaces with temperature in the furnace up to 1250°C. The combustion products are fed from the furnace space into the burner with built-in recuperator and air is heated for combustion. The burner with built-in recuperator in one housing contains a high-speed gas burning device, recuperator and ejector for removing the combustion products. The technical level of the developed burner will correspond to world standards.

The use of the principle of internal heat recuperation in furnaces with forced suction of combustion products through the gas-permeable partitions makes it possible to increase the efficiency of the furnace, improve the quality of the heated items, and conserve fuel. The USSR and CSSR are making chamber and continuous furnaces with internal recuperation of heat for thermal processing of materials. They plan to develop furnaces with output of 90-1600 kW with temperature of the working space 800-1500°C. In the GDR, the furnaces with internal recuperation use a porous refractory concrete.

In order to reduce the consumption of energy, effective heat-guarding designs and materials are being developed for thermal and heating furnaces.

The use of modern heat insulating materials will make it possible to reduce fuel consumption for the furnace by 20-25 percent and increase its productivity by 10 percent. The GDR is developing designs of a furnace arch made of heat-stable reinforced concrete using emitting burners. The USSR is solving questions of lining with fibrous materials.

The development of furnace recuperators has great technical-economic importance. Their introduction into different sectors of industry will improve the efficiency of using gas by roughly 20-25 percent.

The GDR, USSR and CSSR have created and are manufacturing different types of heat recuperators for industrial furnaces designed to heat air to 750°C. In the CSSR, for example, different types of recuperators are produced by plants which manufacture furnaces, in individual cases (for in-house needs) metallurgical and machine-construction plants.

Considerable reserves of secondary energy are found in the gas-transport enterprises of the gas industry which consume about 10 percent of the total volume of extracted gas for in-house needs. In 1981, a large number of the gas turbines used to drive 77 percent of the gas preparation units did not have new generators. This resulted in useless discharge into the atmosphere of an enormous quantity of energy in the form of exhaust with temperatures to 450°C.

Installation of an exhaust channel of gas turbine units of heat recuperators with its use to warm stations and the near-station settlement, as well as to warm up greenhouses cannot guarantee complete use of the discharged heat, especially when compressor stations of high output are built on large main gas pipelines.

The most complete use of potential energy of natural gas burned in gas turbines could be attained by building compressor stations using a steam-gas cycle. In this case the water vapor obtained in the hot water heaters operating on exhaust gases is sent to the steam turbines which are the drive for centrifugal superchargers which inject natural gas. Preliminary calculations have shown that in this case up to 33 percent of the natural gas which is now burned at compressor stations could be conserved.

The question of designing, building and testing an experimental compressor station using a steam-gas cycle has been studied by specialists of the Hungarian People's Republic, USSR and CSSR. At the same time, a technique is being improved for standardizing consumption of energy resources at compressor stations and underground gas reservoirs. Unified heat exchangers are being developed at compressor stations designed to heat water by recovering heat of exhaust gases from the gas preparation units.

The GDR and CSSR are developing heating systems with thermal pumps which make it possible to reduce the specific consumptions of fuel to 50 percent. According to governmental decisions, 16,000 thermal pumps should be introduced into the GDR before 1985. GDR specialists are making a technical-economic analysis of using new methods for comprehensive energy-engineering use of natural gas. In cooperation with the gas workers of Hungary, they are developing methods for improving the operating efficiency of household gas apparatus.

The cooperating parties are developing standards of the CEMA for burners of industrial purpose. Standards of the CEMA "General Technical Requirements," "Methods of Control Tests," "Terms and Definitions" have been approved and introduced. A draft for the CEMA standards "Block Burners. Technical Requirements" has been made.

Mass introduction into different sectors of the national economy of the socialist countries of the most advanced automated gas-using equipment can annually conserve 10-15 percent of natural gas.

However, the CEMA member countries do not have centralized production of this equipment, nor data regarding the demand for it in sectors of the national economy.

In the majority of CEMA member countries, single-type burner devices and automated elements are produced.

An important step on the path towards closer and more mutually advantageous cooperation in the production of advanced gas-burner equipment should be the draft of a comprehensive program on the problem of efficient and effective use of gas prepared according to the decisions of the 35th Meeting of the CEMA Session and stipulating scientific-technical cooperation of the CEMA member countries on the science-technology-production-marketing cycle.

The section "production-marketing" of the comprehensive program includes nomenclature of gas-using equipment and automatic elements recommended for fabrication in the 11th Five-Year Plan and the future. Realization of these plans is currently being reinforced by growing production potentialities. Thus, in the People's Republic of Bulgaria, Hungarian People's Republic and CSSR, progressive automated block burners are being produced. In the Hungarian People's Republic and GDR automatic elements are being manufactured which are needed to complete the burners. The Hungarian People's Republic, GDR and CSSR have set up small-series production of some types of industrial furnaces. The USSR is creating production facilities for centralized production of burners.

Introduction in the current five-year plan of the results from scientific and technical cooperation in the field of creating gas-using equipment according to the decision of the CEMA executive committee must also be implemented with the participation of the CEMA Permanent Commissions for Cooperation in the Field of Machine Construction and in the Field of Oil and Gas Industry.

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FUELS

GAS CONDENSATE USED FOR FUEL PRODUCTION

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 p 18

[Article by V. M. Mishin, Ministry of the Gas Industry: "Unit for Motor Fuel Production"]

[Text] At the end of 1981, a unit for reprocessing 50,000 T of gas condensate per year with the production of automobile gasoline and diesel fuel was put into operation in Dudinka beyond the Arctic Circle.

The draft of the unit was developed by the institute "VNIPIgazdobycha", the start-up and adjustment operations were done by the collectives of Noril'sk-gazprom and the sector PNU.

The draft took into consideration the harsh climate conditions of the Arctic region. All the main and auxiliary apparatus, boilers, tubular linkages, with the exception of the rectification column, were arranged in heated buildings. Steam supply, water supply, purification of the waste water are autonomous, and the electric supply comes from the network of the Noril'sk industrial complex. Production of a commercial product without secondary processes (reforming of gasoline, deparaffinization of diesel fuel) was guaranteed by the introduction of technical conditions for diesel fuel of broad fractional composition developed by the institute "VNIlgaz." These conditions make it possible to obtain diesel fuel with a considerable quantity of fractions which boil off in the limit 130-180°C. They usually remain in the gasoline. This circumstance made it possible, on the one hand, to reduce the solidification point of the diesel fuel to -60°C, and on the other hand, increase the octane number of the automobile gasoline to 76 points without adding an ethyl liquid or high-octane components.

The first trips of the automobiles on motor fuel obtained from gas condensate indicated that this fuel can be successfully used for operation of cars under local conditions. At the same time, there are still a number of problems facing the scientists. The institute "VNIlgaz" with the involvement of specialized organizations needs to make a thorough analysis of the operation of internal combustion engines on local fuel, and if necessary, to prepare recommendations for the use of additives and components to improve the quality of the gasoline and diesel fuel.

The start-up of new gas fields in the region of the Noril'sk industrial complex results in a change in the quality of the gas condensate to be reprocessed. Consequently, it is expedient for the institute "VNIIgaz" to prepare recommendations which take into consideration the qualitative changes of the raw material.

It should be noted that a stable condensate comes to the unit. Propane and partially butanes have been removed from it at the field. This results in losses of valuable components, decrease in the octane number of the automobile gasoline and deterioration in its starting properties. Attentive additional working of the plan for transporting deethanized condensate by the scientists of the All-Union Scientific Research and Planning Institute of Gas Extraction will make it possible to solve this problem. Climate conditions make it possible to obtain automobile gasoline with increased vapor elasticity, and to organize local propane production.

The experience of constructing and analysis of operation of a small-sized unit in the Arctic region indicates that the future lies in creating similar designs with more compact arrangement of the equipment, decreased metal consumption, improved labor productivity, and in the final analysis reduced net costs of the commercial product.

It is obvious that density of the development can be improved by combining the main technological equipment and the equipment of the auxiliary services. For example, it would be expedient to arrange the technological furnaces and steam heaters in one room with the equipment for preparation of water and air of the combined power source. The heat-exchange apparatus, coolers and condensers could be placed in another building on the upper level, and on the lower, pumps for transferring fuel products, etc.

One can obtain great effect from using hermetically sealed, gasketless pumps installed directly on the technological pipelines. This will significantly reduce the volume of the buildings, length of the pipelines, and mainly, improve the safe operation of small-sized units.

Severe climate conditions (low temperature, constant storm winds, polar night) require the fulfillment of special measures to create favorable conditions for the service personnel. It is primarily necessary to create tunnels connecting all the production rooms of the unit.

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FUELS

NEW COMPLEX MONITORS WELL OPERATION

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 82 p 23

[Article: "Complex Controls Well Operation"]

[Text] The complex is compact blocks designed to monitor the parameters of a gas stream on objects of extraction and storage of gas.

For the first time in world practice with the use of a set of equipment one can obtain information regarding the operating regime of the well directly at the head without special equipment for preliminary separation of the liquid from gas.

The complex meets modern domestic and foreign standards for measuring gas consumption, has an easily detachable compressing device which meets the requirements of the Regulations for Measuring Gas Consumption and Liquids by Standard Compressing Devices (RD-50-213-80). The complex can be used both for determining gas consumption with normed efficiency of measurement and as a consumption indicator.

Block units guarantee measurement and recording of the amount of difference (differential) of pressures on the diaphragm at any season with different temperatures of the ambient air. This is attained by high-quality preparation of the gas coming into the differential monometer chamber.

The complex is designed for operation with corrosion-active natural gas containing mineralized and condensed water and hydrocarbon condensate.

The equipment is used especially effectively on clusters of wells, in a group of wells operating in one loop, or connected to one separator.

Specifications

Pressure, mPa	No more than 16
Diameter of changeable diaphragm, mm	From 30 to 85
Gas consumption, 1000 m ³ /day with normed accuracy of measurement	2,000
With operation as an indicator	5,000
Direction of movement of gas stream	From top to bottom and from bottom to top

Overall dimensions, mm	1400 x 700 x 600
Weight, kg	No more than 250
Temperature of ambient air, °C	From +80 to -50

The developer is the All-Union Scientific Research and Planning-Design Institute for Comprehensive Automation of the Oil and Gas Industry and the All-Union Scientific Research Institute of Natural Gas. For information write to the following address: 142700, State Service Post Office, Vidnoye of Moscow Oblast, All-Union Scientific Research Institute of Natural Gas.

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FUELS

COAL COMMITMENTS NOT REACHED

Moscow GUDOK in Russian, 26 May 82 p 1

[Article: "Coal"]

[Text] A total of 250,000 T above the main plan was loaded as a whole for the network. In May, 1.5 million T of coal was shipped in May more than during the corresponding period of last year. However, the additional assignment is not being fulfilled, and the debt has already exceeded 700,000 T.

The Kemerovskaya continues to increase the rates of shipping coal. The main plan has been covered for 463,000 T, the additional plan for 125,000. The gondola cars are being highly efficiently used on the railroad as before. They have already unloaded over 2,500 above the plan. Until recently, the Kemerovskaya has been well equipped with empty cars. Now the situation has deteriorated: some railroads are not fulfilling the regulating assignments.

Vostochno-Sibirskaya has overfulfilled the plan by 74,000 T, and the additional plan by 46,000. But the gondola cars are used on the railroad extremely unsatisfactorily. The working fleet exceeds the standard by 2,000 gondola cars, and half of them, with local freight. Instead of organizing unloading as it should, the railroad workers of Vostochno-Sibirskaya have intercepted the idle gondola cars coming from the east to Krasnoyarskaya.

Sverdlovskaya is steadily guaranteeing coal shipments. From the beginning of the month, 35,000 tons have been shipped above the plan and 22,000 T above the additional plan.

Alma-Atinskaya has steadily guaranteed the supply of cars for coal for several days. But since the 20th of May, the situation has drastically deteriorated. On this day alone, the miners had a shortage of 270 cars. Now the debt is 22,000 T. There is a surplus of working fleet on the railroad as before. It exceeds the standard by 4,000 gondola cars: a thousand in local freight and over 3,000 for transit.

Tselinnaya receives empty gondola cars completely, but does not guarantee their supply for coal. Unloading has been poorly organized: with a surplus of local cars on the railroad, 4,000 gondola cars fewer than stipulated have been unloaded. All of this significantly deteriorated the position with the fuel shipments, the debt for the assignment already exceeds 200,000 T.

There is very little time before the end of the month. The leadership of the railroad needs to take the most decisive measures to improve the use of the gondola cars. The assignment set for May must be fulfilled.

Donetskaya. The situation here continues to remain serious. The debt is 470,000 T. The coal miners who do not use all the supplied cars are partially responsible for this, and partially the railroad workers of Donetskaya. But, as before, the chief problem remains the shortage of loading resources. During two 10 day periods in May, the railroad received 6,000 idle gondola cars fewer than stipulated.

Now the ministry is taking measures to supply the Donetskaya railroad with empty cars. But why were these measures not taken earlier, for there are only 6 days before the end of the month?

It is necessary to also take more active measures to strengthen coal shipments on the L'vovskaya, Odesskaya, North Caucasus and southeast railroads, where the total debt exceeds 100,000 T.

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FUELS

COAL MINE SHAFT FLOODING HALTED

Moscow IZVESTIYA in Russian 15 Jun 82 p 6

[Article by N. Lisovenko, in-house correspondent of IZVESTIYA: "In the Under-water Face"]

[Text] The leading brigade of Viktor Polovtsev from the mine imeni Kalinin in Donets achieved prominent success in March: 202 running meters of ventilation shaft under construction were drilled. However, water began to enter the face in large quantity in the first days of April.

The drillers took all measures to stop its influx. At a depth of over 500 meters from the surface, they drilled a 30 meter well in the flooded sandstone and injected a cement solution under high pressure into it. But water gushed into the well which was 15 centimeters wide. In 15 minutes it had risen to 4 meters. The workers were forced to immediately leave the face.

"In several days the water in the shaft had risen to 120 meters," says the head of the combine "Donetskshakhtostroy" N. S. Burego. "It was pumped out by powerful pumps, about 40,000 cubic meters were removed, a whole pond! But we could not cope with its pressure. Then the mine drillers turned for help to the divers of the Black Sea Steamship Company."

The divers came from Kercha with their equipment. By this time there was a 30-meter column of water above the face (and, we note, the diameter of the shaft was 6 meters). The first diver to enter this abyss was Aleksandr Panchenko. He placed a line under the drilling rig left in the face and soon the winch lifted the 1.5-ton unit. Then he and Nikolay Pilipenko brought the drilling tool from the depth and only then closed the valve above the well from which the water was entering. The pumps completed the work. Now machines and mechanisms are again operating in the shaft.

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FUELS

INSPECTION HELPS TO IMPROVE MINE OUTPUT

Moscow IZVESTIYA in Russian 17 Jun 82 p 3

[Article: "After the Check"]

[Text] The mine "Yagunovskaya" which is located in the Kemerovskaya Oblast has systematically not fulfilled the planned assignments for coal extraction. The Rudnichnyy regional committee of people's control was engaged in this question. It was found that the leaders and other officials of this enterprise did not guarantee proper organization of production, high labor discipline in the collective. As a result, for a long time, of the six drilling combines, only two were operating, of the three stoping complexes, only one, of the 58 ventilation units, 19, and of the 47 pumps only 12. The idle equipment accounted for R 72,000 of amortization deductions which resulted in an unsubstantiated increase in the net cost of the coal.

The check also established that the mine had a wasteful attitude towards expensive equipment, towards metal which often was left in the worked longwalls and drainage galleries and then was prematurely written off. Last year alone, over 600 T of metal timbering were left in the shafts.

The regional committee of people's control punished the guilty parties. The director, chief engineer and chief mechanic of the mine, Comrades Frolov, Oso-kin and Bibik were given strict reprimands and had to partially compensate for the damage cost the state. They were given monetary fines. Some other guilty officials were held responsible.

The group of people's control indicated to the chairman the passiveness in work and suggested a change in attitude towards the fulfillment of their social obligations. The group was helped to improve organization of control over fulfillment of the plans and assignments, observation of discipline, effective use of equipment, material resources and monetary resources.

A second check indicated that the mine "Yagunovskiya" had begun to fulfill the extraction plan for the first time in many years. A large part of the equipment which previously was idle underground was disassembled and raised to the surface. After repair and adjustment it began to be used. Now of the six tunneling combines, four are operating, one is kept in reserve as stipulated by the instructions, and one is in major repair.

Order has been instilled in the use of materials as well. Each section has been given a plan for reuse of materials. During 3 months, 910 m of pipes, 11 T of rails, 20 T of steel cables, 165 chutes and 180 m of chains have been removed from the completed shafts.

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CSO: 1822/229

FUELS

WORKERS PROLONG LIFE OF MINE

Moscow IZVESTIYA in Russian 20 Jun 82 p 2

[Article by A. Kleva, in-house correspondent of IZVESTIYA: "Mine Changes its Address"]

[Text] A powerful dump truck loaded to the top with lignite travelled over the streets of Chita. The citizens greeted this machine with the short inscription "Coal of Tataurov" with an ovation: the large new field Zabaykal' had opened up. It was developed by the collective from the mine "Vostochnaya" in parallel to work in the main face, 70 kilometers.

"Vostochnaya" is the same age as Transsiv and is obliged by its fate to build this trunkline. History recalls that the revolutionary generation of miners of the Chernobskiy mine actively participated in the struggle to accomplish Soviet power in the Far East. Now the mine workers are checking their deeds and actions against their feat. Since the first five-year plans, they have said: the plan is a law and cannot be violated. The tradition of fulfilling the state plan with honor is holy for the miners, the stability of the collective is also a tradition.

In recent years they have extracted coal under difficult mining-geological conditions. In this five-year plan, the mine will work the last reserves. The miners have adopted the task of prolonging the life of the field to the maximum. For this purpose they have started a movement for complete use of the remaining beds, and even under conditions of decreasing labor production to work on a high technical level.

Faced with the problem of decrease in the mine, the party committee and administration turned to the veterans and leading workers for advice. They said: it is necessary to "take an inventory" of the shafts. New data of geology and modern mechanisms made it possible to expand the shaft by 10 meters, having taken them from the support block. As a result, they began to take an additional 25,000-30,000 T of coal from one extraction shaft. With a change in the hydraulic regime, it was no longer necessary to have a barrier of 170,000 T of coal which at some time had been left on the path to the last balanced bed. Because of the workers economy, and thrifty approach to work, the city and close regions have received coal for the fourth year. They had planned to import it into the oblast from the outside.

The geologist discovered the Tataurovskiy field of lignite of shallow depth at this time next to the railroad. "We will start its working," they said at the mine.

The brigade foremen, engineers, members of the party committee, people's deputies turned with this suggestion to the ispolkom of the oblast council, the party obkom, and the USSR Ministry of the Coal Industry. An order thus appeared about designing a section for open pit extraction. The ispolkom of the Chita oblast committee of people's deputies made a decision to remove the land for working the field. In response, the miners developed and began to implement a long-term plan.

Having learned about the unfolding events, those few who doubted the expediency of staying here retreated. The miners returned from the southern latitudes, from the construction sites which had enticed them by the high coefficient, well-built housing and mild climate. They returned to their houses, to their native collective in order to begin everything anew. But this time in a fundamental way. Comrade L. I. Brezhnev spoke about this and the problems of "Vostochnaya" at the 26th CPSU Congress: "We are planning in this five-year plan to build housing, the entire social-cultural complex at even higher rates in these regions, and to improve the supply of consumer goods to the public."

Stripping operations began in April of this year at the field. Only two weeks have passed and the crew of the stepping excavator of G. Alekseyev have exposed a thick bed. Before the end of the year the miners will produce over a half million tons of coal from this field.

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FUELS

BRIEF

NEW TURKMEN GAS FIELD--Ekiz-Ak (Turkmen SSR), 19 Jun--Build-up of a new gas field in southwest Turkmeniya, Ekiz-Ak has begun. Gas mains are being laid from the underground arteries of blue fuel to the group installation. The bulldozer of the leading tractor driver of SMU-1, I. Sayenko from the trust "Sredazneftegazmontazh" moves mountains of sand, penetrating the route for the field gas pipeline. The brigade of installers of S. Davletov from this same construction administration is working intensively. It is faced with fulfilling a large volume of work associated with laying gas lines to wells and installing the main gas pipeline Ekiz-Ak-Gogran'dag. When it is opened in 1983, it will be possible to increase gas influx to the Central Asian-center of the country trunkline by 100 million cubic meters per year. The new underground warehouse, Ekiz-Ak will provide the additional gas. [Text] [Article by colleague of the Krasnovodskiy Oblast newspaper ZNAMYA TRUDA, A. Yezerskiy] [Moscow PRAVDA in Russian 20 Jun 82 p 1] 9035

CSO: 1822/222

GENERAL

INTERVIEW WITH VICE CHAIRMAN OF SOVIET STATE PLANNING COMMITTEE

Budapest NEPSZABADSAG in Hungarian 19 Jun 82 p 5

[Interview with Arkadiy Lalayants, vice chairman of the State Planning Committee of the Soviet Union, by Laszlo Medveczky: "Concerning Soviet Energy Management"]

[Text] The Soviet energy situation has come increasingly into the center of the attention of the world economy since the publication of the natural gas pipe deal between the Soviet Union and West Europe. Contradictory evaluations are appearing in the Western press. According to one opinion the Soviet energy reserves are virtually inexhaustible; those at the other extreme talk about a Soviet oil crisis. What is the truth about this and other questions affecting Soviet energy management? We talked about this in Moscow with one of the best known experts of the theme, Arkadiy Lalayants, vice chairman of the State Planning Committee of the Soviet Union.

[Question] The 26th CPSU Congress adopted a new plan for Soviet energy management. What, in your opinion, are the most essential aspects of the plan?

[Answer] Among the chief aspects of the development of the fuel-energetics complex in the course of the current five-year plan and up to 1990 we have, first of all, an intensive development of the gas industry and a forestalling development of the other branches. We also decided on an accelerated development in the area of nuclear energy. As for oil: the two chief goals here are maintaining the high level of production already achieved and maximally efficient exploitation. Since, according to the new conception, oil is primarily a raw material of outstanding quality for petrochemistry we must rationally reduce its use as a fuel. We are developing coal mining in a planned way--primarily relying on technical progress. It must be noted here that on the basis of economic indexes the most economical method of coal mining is surface extraction; this will be given the emphasis in the current five-year plan.

To characterize this five-year plan with figures: In 1985 we will bring to the surface 630 billion cubic meters of gas; this is more than the 1980 production by 195 billion cubic meters. The quantity of oil will reach 630 million tons, as opposed to 603 million tons in 1980. It is worth noting that the ratio of surface mining in fuels extracted will reach 41 percent as compared to 36 percent in 1980. In 1985 we will produce 1,555 billion kilowatt-hours of electric power. Electric power produced by nuclear power plants will triple in 5 years, in 1985 it will be more than in 1980 by 220 billion kilowatt-hours. Let me note, in conclusion, that hereafter also we will devote special attention in the developmental plan of the national economy to economical and efficient exploitation of the fuel-energy reserves.

[Question] They are talking about a "Soviet energy crisis" in certain Western circles, specifically in an earlier CIA study. They are talking not so much about an exhaustion of the reserves as about the fact that the increase in extraction costs presents an ever more difficult task for petroleum and natural gas mining. What is the truth in this?

[Answer] The truth is that such a problem does not threaten Soviet energy management even in the more distant future. We know very well what they are trying to mount in the West. They see that in the current five-year plan we will increase by 250-300 billion kilowatt-hours, so the rate of development precisely coincides with that of the previous plan period. It is another question whether we want to use less petroleum, in terms of the ratio, for the production of this great volume of energy than in the preceding five-year plan. After all, using a cheaper fuel is today nowhere so much a sign of poverty as it is of sober economic thinking. In addition, we may be talking here about using fuels which are not only cheaper but--and this is the essential thing--more modern.

This is one side of the question. The other side is that we must admit that in the Soviet Union also the age of cheap energy has ended. The costs of extracting fuels increased 1.5 times in the second half of the 1970's, and they have increased more since. The reason for this is well known. While 80-85 percent of the fuel deposits discovered earlier lay east of the Urals and while it is at the price of ever greater material and physical sacrifice that the natural conditions of eastern Siberia and the Far East permit man access to the treasures of the earth, three quarters of the fuels and the energy produced by them are used in the European parts of the country. This ratio will not change substantially in the decades ahead.

And if we are talking about the more difficult exploitation conditions we should also talk about the size of the reserves discovered in the eastern regions of the country. According to data published by the Soviet Academy of Sciences the fuel reserves of the country, calculated as so-called fuel equivalent value, exceeds 6,600 billion tons. The Soviet economy uses about 2 billion conventional tons of fuel per year. Thus even the reserves known at the moment are sufficient for centuries.

[Question] Where are these new fields and how is exploitation of them progressing?

[Answer] I cannot list every rich site, I can only give examples, and not even in order of their importance. Let us begin with coal. The deposits discovered thus far contain more than 300 billion tons, but trillions of tons more may be discovered at those sites the exploration of which will come at the end of the century. Almost without exception these are surface deposits being opened in the Kansk-Achinsk basin, around Kuzbas, in Ekibastus, East Siberia, Yakutia and the Far East.

The amount of oil and gas to be found in the western Siberian basin alone would ensure good domestic supply and export for long decades. But we are opening new gas and oil fields to maintain continuity. As has been said already, these are in increasingly distant areas, more difficult to approach and exploit. I can announce with assurance that our people have mastered these difficult conditions in every respect in recent years. In proof of this it is enough to mention the example of the western Siberian gas and oil field. Without any exaggeration, heroic work is being done there and as a result many of the plans have been realized already. New cities have been built in the northern part of Tyumen raion. For example, Nizhniy Vartovsk, with 100,000 inhabitants already, and Surgut of similar size. Today we can meet with the names of communities being born such as Urengoy and Hadim. Our work keeps moving north, beyond the Arctic Circle. Not only are we putting up drilling towers there, conjuring up cities with all the conveniences in the realm of eternal frost, we are building roads, railroads and pipelines under difficult circumstances. The Tyumen-Tobolsk-Surgut-Nizhniy Vartovsk rail line will reach Urengoy this year. A highway network is being built at the same time, which will be of great significance in this marshy, difficult to travel region.

Although the question did not pertain to it, let me note here that in the course of developing the fuel and energetics complex we also had to solve other momentous tasks. For example, we had to build dozens of petrochemical and energy technology plants out there where they mine the oil and the cheap Siberian coal.

[Question] Coal mining did not fulfill its plan for last year. What was the reason for this? This was a successful branch of industry with a long past. Do you plan a comprehensive development in the old, European mines and how is exploitation proceeding in the new surface sites in the eastern part of the country?

[Answer] It is true that the coal industry has met with some considerable difficulties in recent years. But this is not due to human failure, rather it is due to the fact that the geological conditions have worsened a great deal in the traditional, deep mines. The work sites went deeper and deeper in search of good quality coal. In the Donetsk basin, for example, the depth of the shafts is already a thousand meters or more. At such depths the danger of accidents is very great and the temperature of the air at the work sites is very high.

Despite these difficult conditions we are not even thinking of closing the Donetsk, Kuznyetsk or Karaganda mines. However difficult it is to get at we

need the outstanding quality coal mined there. Of course, this cannot mean that we should endanger the people working there. There has been no thought of such a thing. We see the solution in complex mechanization and automation. The fruit of this program, decided upon years ago, is now maturing. The production of the machine factories specialized for this purpose has grown immensely, and as a result the deep mines are getting equipment and safety systems with the aid of which safe and continual production can be maintained for a long time.

At the same time, as I have said already, the surface deposits opened and to be opened in the eastern parts of the country represent the future of our coal mining. Surface operations are accompanied by a great increase in productivity. According to our experiences thus far the productivity of surface mining is more than ten times that of traditional mines. Without exception the surface fields uncovered thus far are ones where one can mine 40-50 million tons and dozens of additional billions of tons can be found in other fields which can be mined with surface mining. According to the plans surface mining will produce 300 million tons of coal in 1985. By that time 41 percent of the output of coal mining will come from these new discoveries. This ratio will continue to change in the direction of surface mining in the years to follow. To sum up what has been said, we have no doubt that a healthy development will be characteristic of the Soviet coal industry up to the end of the century and beyond.

[Question] As has been said in our conversation already, the present energy balance of the country will go through a fundamental change, according to the new program. Petroleum will decrease in use while natural gas and nuclear energy will increase. But this is not only a matter of making the decision, the change mentioned will require great investments. Is working the new power plant network into a uniform energy system a big problem?

[Answer] In the first place I would like to make it clear that it is not replacing oil with other fuels which requires the great expenditures, rather it is maintaining the high oil production already achieved. But this is worth the expenditure, because according to our principles oil is no longer so much a fuel as it is a valuable raw material for petrochemistry, and in the more distant future this will be even more true.

As for the development of the energetics balance of the country, this work began a long time ago. One chief direction of the development is long distance and high capacity electric current transmission. We already have in operation such 750 kilovolt lines as the Leningrad-Moscow and the Dombas-Dnepr-Western Ukraine links. We are building first the long distance lines with the aid of which we can carry large quantities of electric power from the eastern parts of the country to the central, European areas and the Urals region. In this 5-year plan we will build the first section of the Ekibastus-Center line and the Ekibastus-Urals link.

Naturally this construction is taking place in harmony with the development of a uniform energetics system. At present this system--with the aid of which power can be forwarded to any site at will--covers an area of 10 million

square kilometers inhabited by 220 million people. Of the 270 million kilowatt output of the power plants, 230 million kilowatts are already linked into this system. As is well known, the energetics systems of the eastern European CEMA countries work in parallel with the Soviet uniform power system. We assign great significance in this cooperation to the Dombas-Dnepr-Vinnitsa-Albertirsh lines handed over in 1978.

[Question] Academician Aleksandrov has said in an article that 30 years will be needed to make the energy balance of the Soviet Union most modern and most economical. How do you, as a leading expert in planning, see the near future of Soviet energy management?

[Answer] Our plan for the modernization of the structure of the fuel-energy balance is based primarily on an intensive development of electric power. The tasks awaiting solution here are:

--development of nuclear energy, primarily in the European areas of the country;

--creating large capacity fuel energetics complexes, based primarily on coal and natural gas, in the eastern areas--Ekibastus, Kansk-Achinsk and West Siberia. Power plants are being built in these places with 500 and 800 kilowatt blocks and we plan use of even larger blocks in the future;

--better exploitation of the effective water reserves in the eastern part of the country; and

--renewing and modernizing the store of energetics equipment, getting better output by virtue of concentration and new types of equipment.

We have mentioned already that electric power production will increase by 250-300 billion kilowatt-hours in this five-year plan. New nuclear and hydroelectric power plants will provide 70 percent of this increment. Understandably, the nuclear power plants will be built primarily in the European parts of the country. At present, ten nuclear power plants are being built at once west of the Urals, which will be completed in this plan period. At the same time, high output hydroelectric power plants will be built in the future primarily in Central Asia and the far eastern regions. According to our plans by the end of the 1980's nuclear power plants will provide one-fifth of all power produced.

[Question] These days energy is a product which is produced ever more expensively. Its economical use and conserving energy are important economic interests. One can read about this more and more in the Soviet press also. What will be done in the future in the area of energy conservation?

[Answer] Understandably, energy conservation fits into that principle enunciated at the 26th CPSU Congress according to which the economy should be economical. We see clearly what conservation possibilities hide in every phase of energy use, from bringing it to the surface to its use. It is surprising to outsiders but it is a fact that we, like the developed

capitalist countries, use only 43 percent of the fuel mined. Which means 57 percent is wasted. Under present conditions not every reason for this can be eliminated, but we cannot acquiesce in such a low degree of use. What are those causes of this loss which we want to put an end to? We are persuaded that the technological process of energy conversion is not yet at an adequate level. The technical level of fuel using equipment is relatively low also. Last but not least, a source of much of the loss is that the public still thinks of energy as being cheap; the cheap consumer prices do not encourage conservation. The results of efforts thus far prove that creating the conditions necessary for a broad realization of energy conservation are two to three times cheaper than producing and delivering the same amount of energy. Starting from this it was decided that 200 million tons of fuel must be saved in the current plan period. The 40 million tons per year of this, calculated as a conventional fuel, come to two percent of present consumption. But saving even 1 percent would represent a profit of almost 2 billion rubles per year.

We expect to get 60 percent of the planned savings by accelerating the realization of scientific-technological achievements. According to the calculations another 30 percent may come from reducing primary losses, by better insulation of buildings, and better use of secondary heat and energy sources in industrial processes and in power plants. And finally, savings can be realized by decreasing the loss arising during transportation and storage of fuels.

[Question] In conclusion, let us talk briefly about the future. In addition to nuclear energy, what sort of new energy sources do you count on using in the decades ahead?

[Answer] In the long run we are turning great attention to use of solar, geothermal and wind energy. We are now planning widescale use of these inexhaustible energy sources by the end of the century. According to our plans, after the year 2000, we will be able to replace 50 million tons per year of organic fuels with these sources. In the beginning, solar energy will replace 10 million tons of this, wind energy 10 million tons and geothermic energy 30 million tons. I repeat, we are counting on these energy sources only at the end of the century, but experimental development is already under way at a fast pace. What great significance we attribute to this question is indicated by the fact that we have created a special committee to work with the state planning committee which has the task of coordinating and guiding research and development of this type taking place in the scientific institutions of the country.

Moscow, June 1982

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GENERAL

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MORBIDITY, ORGANIZATION OF MEDICAL CARE OF WORKERS AT MAIN PIPELINES

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, 1982 (manuscript received 21 Sep 81) pp 28-32

[Article by Yu. F. Makarenko, Sanitary Administration, RSFSR Ministry of Health, under the Ministry of Petroleum and Gas Construction]

[Text] Of the numerous tasks confronting Soviet health care, one of the most important is the health care of workers at industrial enterprises and the reduction of worker morbidity with the temporary loss of work capacity.

However, insufficient attention has been given to studying the causes of morbidity in main-pipeline workers and to the improvement of their medical care.

At the same time, more than 50,000 km of pipeline have been laid during the 10th Five-Year Plan. Our nation's petroleum output has increased by nearly 20-fold compared with 1936, and the gas output, by 160-fold. The prospect for 1985 is a petroleum output, including gas condensate, of 620-645 million tons and a gas output of up to 600-640 million m³.

The importance of the further development of this branch of industry and, also, the construction of large electric power stations using natural and casinghead gas was further stressed by the CPSU Central Committee (1980) at a conference of energy workers.

The number of main-pipeline workers have shown a much more rapid annual increase than the numbers of workers in other branches of the national economy.

A feature of the work and life of pipeline workers is the frequent transfer of sectors and mechanized columns, sometimes for hundreds and thousands of kilometers, disrupting the normal life style, displacing the biological rhythm by 2 to 4 hours (due to time-zone changes) and exposing the workers to the influence of a variety of unfavorable natural factors. Workers and the members of their families live for long periods in mobile residential developments.

Furthermore, the specific work conditions have a negative impact upon the workers' health (forced body position during welding, contact with petroleum products, unfavorable meteorological conditions, especially in regions of the North and Siberia, welding aerosols, noise, dust, vibration, ionizing radiation and so on).

Pipelines are often constructed in inaccessible, swampy and unpopulated regions far from regional therapeutic and prophylactic institutions. Therefore, the medical care of pipeline workers required special organizational approaches. In September 1946 the Sanitary Administration of the RSFSR Ministry of Health was organized under the Central Directorate of the USSR Ministry of Petroleum Construction (later under the Ministry of Construction of Petroleum and Gas Industry Enterprises).

The Sanitary Administration includes 19 medical and sanitary departments, organized under large trusts and unions and providing medical care to workers through a network of mobile medical and paramedical health stations.

Foundary (shop) physicians usually serve three to four and more construction, assembly, specialized or auxiliary subdivisions with a total number of workers of from 1,500 to 3,000. Subordinate to the physician and under his direction operate four to eight mobile paramedical health stations.

Among the obligations of the foundary physician are the reception of therapeutic patients at paramedical health stations during planned excursions along the route, comprehensive sanitary-hygiene antiepidemic measures, the improvement of working conditions, the treatment and cure of dispensary patients, the analysis of disease incidence, etc.

An important feature in the work of a foundary physician is his close contact with the local health care organs and institutions in the interests of providing medical care, particularly specialized care; this was emphasized by the RSFSR Ministry of Health and the Ministry of Petroleum and Gas Construction (1976) and by the USSR Ministry of Health (1977). However, for various objective and subjective reasons the local health care institutions do not always provide such care.

The most important requirement for further improving working conditions and enhancing the quality and effectiveness of medical care for main-pipeline workers is an intensified study of the causes of morbidity and the development on this basis of vigorous therapeutic and sanitary measures.

Analysis of morbidity with a temporary loss of work capacity in main-pipeline workers shows that it is considerably lower than in workers in other branches of the national economy; in 1979 morbidity for pipeline workers in various regions of the country was from 42.32 to 67.34 cases and from 610.40 to 884.75 days per 1,000 workers with an average (as a whole for the branch) of 52.24 cases and 744.70 days.

In characterizing the age-sex structure of main-pipeline workers, it should be stated that 78.7 percent of the workers are males. Most (39.7 percent) workers are 30-39 years of age (41.7 percent of male and 32.2 percent of female workers); 23.7 percent of the workers are 40-49 years of age (22.7 percent of male and 27.2 percent of female workers); 21.2 percent are 20-29 years (21.4 percent of male and 20.6 percent of female workers). A nearly identical pattern was noted in the analysis of the age-sex composition of individual occupational groups.

Analysis of worker composition with respect to trade demonstrated that 45 percent of males and the same number of females had continuous work experience in a specialty for up to 3 years; 27.3 percent of the workers (29.1 percent of male and 20.2 percent of female workers) had experience equal to 8 or more years.

Table 1. Morbidity and Work-Time Losses in Main-Pipeline Workers (per 1000 workers)

Illness class	Sex	Number of people ill	Number of illnesses	Number of cases of work incapacity	Days of work incapacity		Mean duration of single case of work incapacity	
					calen-der	work-ing	calen-der	work-ing
I. Infectious illnesses	M	44.3	45.1	48.3	840.9	623.1	17.4	12.9
	F	64.5	64.5	64.5	568.9	454.5	8.8	7.0
	Both	48.6	49.3	51.7	783.0	587.3	15.1	11.3
IV. I. Illnesses of nervous system and sense organs	M	62.5	62.5	75.2	817.1	610.5	10.8	8.1
	F	41.1	41.1	41.1	284.5	219.9	6.9	5.3
	Both	58.0	58.0	68.0	703.9	527.4	10.3	7.7
VII. Illnesses of circulatory organs	M	30.9	30.9	35.6	598.6	452.1	16.8	12.7
	F	49.9	49.9	55.7	985.3	768.3	17.6	13.7
	Both	34.9	34.9	39.9	680.8	519.3	17.0	13.0
VIII. Illnesses of respiratory organs	M	211.4	226.4	229.6	2008.7	1521.8	8.7	6.6
	F	158.4	199.4	202.2	1369.5	1061.6	6.7	5.2
	Both	200.1	220.7	223.8	1872.8	1423.9	8.3	6.3
IX. Illnesses of digestive organs	M	66.5	66.5	72.1	1186.1	856.7	16.4	11.8
	F	55.7	55.7	58.7	912.0	654.0	15.5	11.1
	Both	64.2	64.2	69.2	1127.8	813.6	16.2	11.7
X. Illnesses of urogenital organs	M	7.9	7.9	8.7	114.0	86.3	13.1	9.9
	F	70.4	70.4	76.2	1299.1	950.1	17.0	12.4
	Both	21.1	21.1	23.1	366.0	270.0	15.8	11.6
XII. Illnesses of skin and subcutaneous tissue	M	31.7	33.3	41.2	575.6	419.6	13.9	10.1
	F	20.5	20.5	20.5	193.3	146.6	9.4	7.1
	Both	29.3	30.5	36.8	494.4	361.6	13.4	9.8
XIII. Illnesses of bones and motor organs	M	22.2	22.2	22.2	318.3	237.5	14.4	10.6
	F	26.4	26.4	29.3	281.5	222.9	9.6	7.6
	Both	23.1	23.1	23.7	310.5	234.4	13.1	9.8
IV. Accidents, poisonings and traumas	M	32.5	35.6	35.6	1032.5	771.2	29.0	21.6
	F	20.5	20.5	20.5	1313.8	956.0	64.0	46.6
	Both	29.9	32.4	32.4	1092.3	810.5	33.7	25.0
Total	M	517.1	537.6	575.7	7819.6	5829.0	13.6	10.1
	F	533.8	574.8	606.9	8087.8	6081.9	13.3	10.0
	Both	520.5	545.5	582.3	7876.6	5882.8	13.5	10.1

As apparent from Table 1, the morbidity per 1,000 workers as a whole for all illnesses comprised 520.5 people ill, 545.5 illnesses and 582.3 cases of illness; these parameters were somewhat higher among women (533.8, 574.8 and 606.9, respectively) than among men (517.7, 537.6 and 575.7).

A similar pattern was observed in the analysis of the number of calendar and working days of work incapacity per 1,000 workers. The average duration of one instance of work incapacity was somewhat lower among females than males: females were ill more frequently but for a shorter time than males, although the difference was not very great.

In males, the highest level of morbidity per 1,000 workers involved illnesses of the organs of respiration, the nervous system and sense organs, digestive organs and illnesses of the skin and subcutaneous tissue; males had a high rate of accident, poisoning and trauma. Females more frequently than males suffered infective illnesses and illnesses of the circulatory and urogenital organs. Of interest is the relatively high incidence among women of diseases of the bones and motor organs. This may be explained by the fact that a large number of female main-pipeline workers do work that does not require much training but involves definite physical effort, work in the open and exposure to diverse atmospheric-climatic factors. It is for this reason that females have a rather high average duration of a single instance of temporary work incapacity associated with accident, poisoning and trauma.

In analyzing the morbidity with the temporary loss of work capacity in main-pipeline workers in relation to sex and age, it should be stated that the level of morbidity per 1,000 female workers in the first three age groups (up to 39 years) is higher than in males, while morbidity with temporary work incapacity is, in contrast, higher in males at the ages of 40-49 and 50-59 years.

The difference between the number of illnesses and instances of temporary work incapacity and the number of people ill increases with age because chronic illnesses develop, and a single individual in the course of a year may suffer multiple repetitions of acute illnesses and an aggravation of chronic illnesses.

An analogous pattern was also found when data on the number of calendar and working days of incapacity per 1,000 workers were analyzed with respect to sex and age.

An analysis of the distribution of morbidity with respect to occupational groups (Table 2) shows that its level was highest in males of the auxiliary occupations and in females of the main occupations, while it was lowest in engineering-technical and office workers, both males and females.

Workers in the main occupational groups are directly involved in laying the pipelines. Among the auxiliary occupations are the builders of surface structures (compressor stations and gas-pipeline cleaning facilities, pumping stations, petroleum pipelines, etc.). In the third occupational groups are engineering-technical and office workers.

Table 2. Morbidity and Work-Time Losses in Main-Pipeline Workers in Relation to Age and Sex (per 1000 workers)

Parameters	Main occupations			Auxiliary occupations			Engineering-technical and office workers		
	M	F	Both	M	F	Both	M	F	Both
Number of people ill	525.9	771.4	540.9	543.2	508.2	534.7	391.0	504.1	440.9
Number of illnesses	553.7	914.3	575.7	560.8	541.0	556.0	397.4	528.5	455.2
Number of cases of illnesses	605.6	1028.6	631.3	590.8	557.4	582.7	416.7	561.0	480.3
Number of calendar days of incapacity	7109.3	12457.1	7434.8	8747.8	6923.5	8302.7	6903.8	8577.2	7641.6
Number of working days of incapacity	5351.9	9428.6	5600.0	6426.8	5196.7	6126.7	5307.7	6447.2	5810.0

The percentage of workers older than 50 years and younger than 20 is negligible which is explained by occupational selection determined by the specific conditions of work and life. Associated with occupational selection is a relatively lower level of morbidity, characterized by a predominance of acute illness and traumas and by a lower rate of chronic morbidity.

Of definite interest is the analysis of the dependence of morbidity upon the time of continuous work experience. All morbidity parameters in people with continuous work experience of from 3 to 5 years were somewhat higher than in people with experience of less than 3 years, which is explained by the adjustment to the working conditions after 3 years of work. The rate of morbidity increased in both males and females with experience of more than 5 years. An important role here is played by the 100 percent payment certificate for temporary work incapacity after 3 years of continuous experience.

B. Shcherbin, Minister of Construction of Petroleum and Gas Industry Enterprises of the USSR, noted in response to questions from a correspondent of the newspaper IZVESTIYA (7 Jun 80) that the additional measures adopted by the party for the harmonious and balanced development of the Western Siberian petroleum and gas complex will permit a still more energetic and persistent introduction of industrial methods of construction, creation and development of the production base, more rapid construction of fuel-energy works, of residence, theaters, hospitals, nurseries and sociocultural and social establishments. The people contributing their labor to the development of the Tyumen North, Siberia, the Far North and the Far East require a high-level medical care.

This is the responsibility of workers in the Sanitary Administration and the local health-care institutions.

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GENERAL

TASKS IN FURTHER DEVELOPMENT OF TYUMEN OIL, GAS COMPLEX

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[Article by B. Trofimov, Tyumenskiy CPSU Obkom section chief: "Tasks in Further Developing the Oil and Gas Complex in Tyumenskaya Oblast"]

[Text] Tyumen--In the implementation of the energy program in the 11th and 12th 5-Year Plans a special part is played by the oil and gas complex. At the CPSU Central Committee November (1981) Plenum L. I. Brezhnev noted: "The country is greatly indebted to the heroic work of the gas industry, oil industry and construction workers who have opened up access to the resources of West Siberia¹."

The accelerated commissioning of the new deposits at the early stages of prospecting and the introduction of progressive equipment and technology ensured at unprecedented oil and gas extraction rate in Tyumenskaya Oblast. In 1980 some 4.4 times more gas was produced, 2.5 times more oil (with gas condensate) produced than in 1975. The targets for the first year of the 11th 5-Year Plan were successfully fulfilled by the enterprises of the oil and gas complex: 329.2 million tons of oil and 195.7 billion cubic meters of gas were extracted.

In the 10th 5-Year Plan the oblast's industry sold output worth R24.1 billion--R35.8 million more than the planned level. The annual volume of industrial production increased 87 percent compared with 1975 and the profit obtained exceeded R7 billion.

In providing wellhead facilities for the Samotlor oilfield we succeeded in reducing road construction norms 66 percent, pumping station construction norms 85 percent and the oil tank farm [Neftepark] construction norms 92 percent. Over R320 million in capital investments was saved. In the 10th 5-Year Plan over R450 million in capital investments were saved at the Urengoy gas deposit while the number of boreholes was halved and the number of installations for the preparation of gas was reduced by a factor of three by improving their design and increasing their capacity.

The introduction of enlarged-diameter pipes and improved pumping units has made it possible to increase labor productivity 70 percent, to reduce the installations' metal-intensiveness by 15 percent and to reduce capital

investments in pipeline transport by one-third. Hundreds of millions of rubles have been saved thanks to the introduction of the multiple oil borehole drilling method and the modular method of construction.

The complex has now entered a new stage of development characterized by the growing magnitude and complexity of work. The features of this stage necessitate the all-around solution of a number of fundamental questions. It is a question not simply of settling a new region but also of developing it. Tyumenskaya Oblast must be viewed within the system of the overall territorial division of labor taking into account the prospects for the further development of the oil and gas extraction industry and the refining industry, the creation of a production and social infrastructure and the comprehensive use of natural resources and environmental conservation.

The acceleration of the rate of oil and gas extraction requires the widespread use of the achievements of scientific and technical progress and the development and introduction of new equipment and production technology taking into account the oblast's complex natural, climatic and geological engineering conditions, an examination of the questions of improving the efficiency of oil and gas extraction and transportation shows that the oil and gas industry as it is conceived at present cannot develop without a close multifaceted link with various sectors of the national economy. While promoting the acceleration of scientific and technical progress in other sectors, it depends directly on the technical standard and development of the national economy as a whole.

The sector composition of Tyumenskaya Oblast's industry has now become more complex. A discrepancy has emerged between resources of casinghead gas, unstable gasoline and condensate and possibilities for delivering them to consumers; volumes of freight shipments and the development of the transport system; the growth rates of manpower resources and construction organizations' capacities for installing apartment blocks and cultural and consumer services establishments; and boundless opportunities for creating electricity capacities and the shortage of electricity in the oblast. The scale and pace of the work require an improvement in the coordination of many sectors, departments and economic regions.

The activity of ministries and departments in resolving a number of questions is not yet being fully coordinated. The inadequacy of local soviets' rights and potential in ensuring West Siberia's comprehensive development is becoming increasingly obvious.

The question of the composition of the oil and gas complex and the indicators which go into the 5-year and annual plans for its development deserves special attention. The USSR Gosplan approves those for the West Siberian territorial production complex, although both resolve one and the same task--increasing the extraction of oil, gas, gas condensate and the products manufactured from their refinement. The oil and gas complex does not include the enterprises and organization of the ministry of railroads, the RSFSR ministry of the river fleet, the USSR ministry of powers and electrification, the ministry of civil aviation, the USSR ministry of communications, the URRS Gossnab, the RSFSR

council of ministers main administration for the transportation and supply of petroleum and petroleum products and other sectors servicing the complex. The complex does not include the Tobolsk petrochemical combine.

The USSR Gosplan has approved methodological instructions for the compilation of targeted comprehensive programs for the solution of regional problems and the formation and development of territorial production complexes. However, as yet there are still methodological and organizational errors. Comprehensive plans are not sufficiently geared toward the solution of intersector problems since they are mainly the sum of the indicators in sector plans. That is why questions of organizing intersector production facilities, joint bases for the construction industry, the transport network and engineering installations.

Considering that the participation of virtually all sectors of the oblast's economy in the development of the oil and gas complex is constantly increasing, it would be expedient to ensure that the main production forces are included in the complex and that the oblast's administrative boundaries serve as its territorial borders. The list of indicators approved in the 5-year and annual plans for the development of the oil and gas complex should include the main indicators for the plan targets for all sectors.

The solution of these questions will make it possible to eliminate disproportions in economic activity, to create the necessary production, social and consumer service infrastructure, and to improve the national economy's provision with hydrocarbon raw material and products manufactured from its refinement. Investing the leaders of the largest main administrations with the rights of deputy ministers of the relevant sectors would also produce effective results.

One factor delaying the development of the oil and gas complex is construction organizations' insufficient capacity and their lack of a proper construction base. This factor, alongside the limited choice of local construction materials and raw material for producing concrete and bricks, has made it necessary to import materials from other oblasts to the region where the oil and gas deposits are being developed. Local resources have been developed only slowly.

The protracted uncertainty of the prospects for the complex's development has given rise to disproportions. Some ministries involved in the formation of the complex, for instance the USSR ministry of industrial construction, have viewed their activity here as temporary and have not created a capital industrial base or powerful construction collectives. The capacity of all construction organizations taking part in the development of the oil and gas complex as of 1 January 1981 was about R3 billions-worth of contract construction and installation work, which is considerably less than necessary. In the initial period of the region's development no single long-term plan was developed for construction, and questions relating to the siting of construction organizations, production sharing and material and technical supplies were not thought out precisely. The underdevelopment of transport delayed the introduction of progressive methods of organizing the construction process (the installation of modular subassemblies, the creation of mobile construction subdivisions).

Housing construction was geared to a considerable extent to patronage deliveries from Irkutsk, Omsk and Perm. The series of apartment blocks produced there were poorly adapted to northern conditions. As a result of the shortage of the construction organizations' capacities and the lack of construction materials, deposits have been commissioned with substantial amounts of uncompleted work which has led in particular to a shortage of capacities for the preparation of oil for pumping.

The Ust-Balyk-Omsk main oil pipeline was commissioned in 1967. To date the plan for the construction of housing and cultural and consumer service projects at the oil pumping stations has been fulfilled by only two-thirds. This is leading to increased turnover of pipeline worker cadres and a reduction in the reliability of the oil pipeline's operation.

The Tyumenskaya Oblast geologists' successes would have been more substantial if there had been no errors in sector planning. Back in 1967 the drilling of exploratory boreholes in the oblast reached almost 500,000 meters. But in 1972 it dropped to 385,000 because of a decision by the planning organs to cut back on the level of exploratory drilling. As a result radical measures were needed to build up drilling levels again and, in 1980, to surpass an annual drilling level of 1 million meters.

The region's exploitation from the outset has been marked by a lack of coordination in the development of some forms of transport caused by variations in financing norms and the lack of an integrated plan for the establishment of a transport network. A failure to fully appreciate the importance of the transport factor was revealed in the sphere of design, capital investment planning and material and technical supply. Some planning decisions took into account only current interests and ignored long-term needs. The USSR ministry of transport construction used a variety of excuses to avoid having to rebuild a road needed to exploit unique gas fields. The ministry of the gas industry was obliged to take on the job. The RSFSR ministry of the river fleet could do more by carrying out major work on small rivers.

The provision of transport services in northern parts of the oblast is insufficiently developed. Although in the 10th 5-Year Plan particular attention was focused on the construction of a railroad and the river fleet's performance improved, only 80 percent of the planned volume of freight is being moved there. The volume of freighting by river transport is much lower than planned. In 1981 around 13 million tons were freighted, compared with a planned 14.4 million (as against a total requirement of 16.8 million tons); in 1982 the plan allows for 14.8 million, compared with a stated demand for 17 million.

Supplying the oil and gas complex, especially installations engaged in the extraction and transportation of oil and gas, with electricity is one of the most serious problems. Because of a 2-year delay in the construction of the Tyumen-Surgut 500 powerline power trains had to be sent to oil-extracting areas and temporary power stations set up. The cost of supplying electricity on a temporary basis was equal to that of an entire powerline. The first electricity supplies came from diesel power stations, gas turbine power trains and mobile gas turbine power stations. The Tyumen-Surgut power line was only

commissioned in 1969 and the first power unit of the Surgutskaya Gres, which operates on casinghead gas, was commissioned in 1972.

The majority of compressor stations, at which the rated capacity of gas pumping units is already in excess of 4 million kilowatts, are supplied with electricity on a makeshift basis. As a result it is not possible to fully automate the operation of main gas pipelines. In the end this is very costly.

The program for expediting the Tyumen complex's development envisages a sharp increase in the exploitation of petroleum gas reserves. Progress is still too slow on the construction of installations involved in petroleum gas utilization.

Tyumenskaya Oblast is a very big consumer of motor fuel. This could be made locally but oil is pumped from the oblast to the country's oil refineries and then millions of tons of fuel and lubricants are transported to oil and gas extracting regions by rail and ship.

The comprehensive exploitation of mineral resources is particularly important when working deposits containing several different minerals. Gas condensate deposits are in this category. Condensate is a highly efficient and unique raw material for a number of sectors which can be used both to produce motor fuels and in the organic synthesis industry.

The economic efficiency of refining one ton of condensate is the same as for refining 3-5 tons of oil. The prime cost of one ton of gasoline produced from condensate is 50 percent less than that of one ton of gasoline produced from Volga region oil. In this connection it is imperative that all the products contained in natural gas are extracted as fully as possible.

Research has shown that compared with oil gas condensate from North Tyumen deposits is a more valuable raw material for obtaining gasoline, kerosine and diesel fuel, as well as for deep chemical refining. It lacks the heavy hydrocarbons, thus obviating the need for catalytic and thermal cracking and other costly refining processes. The absence of harmful impurities is an important characteristic of Tyumen condensates:

They contain only negligible amounts of sulfur. In the production of motor fuels 1 ton of gas condensate is even higher when refined, particularly in the production of aromatic hydrocarbons, since it contains 2.5-3 times more of the raw material than oil.

Olefins and other valuable products can be obtained by comprehensively refining condensate fractions which evaporate by boiling at 140-300 celsius. By refining it in this way 1 million tons of Tyumen condensate will produce 100,000-150,000 tons of Ethylene, 53,000-83,000 tons of propylene, 36,000-46,000 tons of butylene, 70,000-170,000 tons of benzene, 92,000-100,000 tons of toluene, 43,000-44,000 tons of xylene, 31,000 tons of pyrobenzene, 77,000 tons of green oil, 37,000 tons of pyrolysis coke and 150,000-190,000 tons of fuel gas.² These figures confirm the view that organizing large-scale

chemical production on the basis of Tyumen gas condensate will yield good economic returns.

For the first time in the country's history an opportunity to plan the development of vast reserves of condensate as an independent raw material is presenting itself. It is also possible to talk about long-term condensate production of 30-50 million tons a year--the equivalent of 90-150 million tons of oil.

Transporting condensate is 3-5 times more efficient than transporting natural gas. Some 40-50 million tons of condensate a year (compared with 8-10 billion cubic meters of gas) can be pumped through a 1,020 mm-diameter pipeline. The ministry of the gas industry could pay more attention to condensate extraction. But capacities for sinking wells on the Valanzhinskiy gas condensate deposits are still inadequate. The problems involved in transporting and refining condensate have still not been completely solved.

As was pointed out earlier, the development of the oblast's oil and gas industry depends on the supply of equipment and materials. A large quantity of casing has been arriving in the oblast for drilling wells. On the face of it everything looks fine: the quantity of pipes being sent by the supplying plants is in line with the planned drilling volumes. But not all of the pipe rollers' output can be used without further attention. The ministry of the petroleum industry has therefore instructed the Tyumen main oil and gas administration to build units for the repair of pipes from USSR ministry of ferrous metallurgy plants at each of its associations.

We have examined a number of, in our view, acute problems in the West Siberian oil and gas complex's development. Solving them means creating a management system whereby the interests of the sector and the region can be organically combined.

The Tyumen oil and gas extracting complex is an integral part of the country's unified national economic complex. No major problems in the oblasts' development can be solved locally--they must be examined from an all-union standpoint.

FOOTNOTES

1. L. I. Brezhnev. Speech at the 16 November 1981 CPSU Central Committee Plenum. Moscow, Political Literature Publishing House 1981, p 7.
2. I. D. Karyagin and V. S. Bulatov, "The Development of the North Tyumenskaya Oblast Gas Industry" (Razvitiye Gazovoy Promyshlennosti Severa Tyumenskoy Oblast), Moscow, "Nedra" Publishing House, 1979, p 15.